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(54) **OBJECT ORIENTATION DETECTION SYSTEM**

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G06T 7/73 (2017.01)
A63G 7/00 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***G06T 7/73*** (2017.01); ***G06N 20/00*** (2019.01); ***G06V 40/103*** (2022.01); ***G06V 40/161*** (2022.01)

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CPC G06T 7/73; G06N 20/00; G06V 40/103; G06V 40/161; A63G 21/18; A63G 31/00; A63G 7/00
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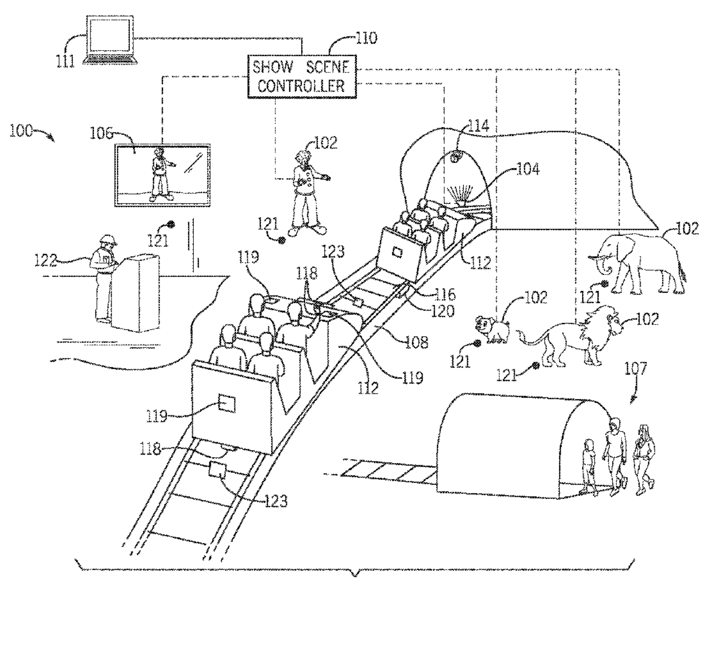
(57) **ABSTRACT**

A ride system includes one or more sensors and a controller. The controller receives, from the one or more sensors, position data indicative of the position of a body and/or face of guest on the ride. Using the position data, the one or more controllers, determine a face direction, face rotation, or both of the guest, independent of sensor observations of the face direction and rotation. One or more features of the ride are controlled based upon the determined face direction and/or face rotation.

29 Claims, 4 Drawing Sheets



Related U.S. Application Data

continuation of application No. 16/277,049, filed on Feb. 15, 2019, now Pat. No. 10,825,196.

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A63G 21/18	(2006.01)
A63G 31/00	(2006.01)
G06N 20/00	(2019.01)
G06V 40/10	(2022.01)
G06V 40/16	(2022.01)

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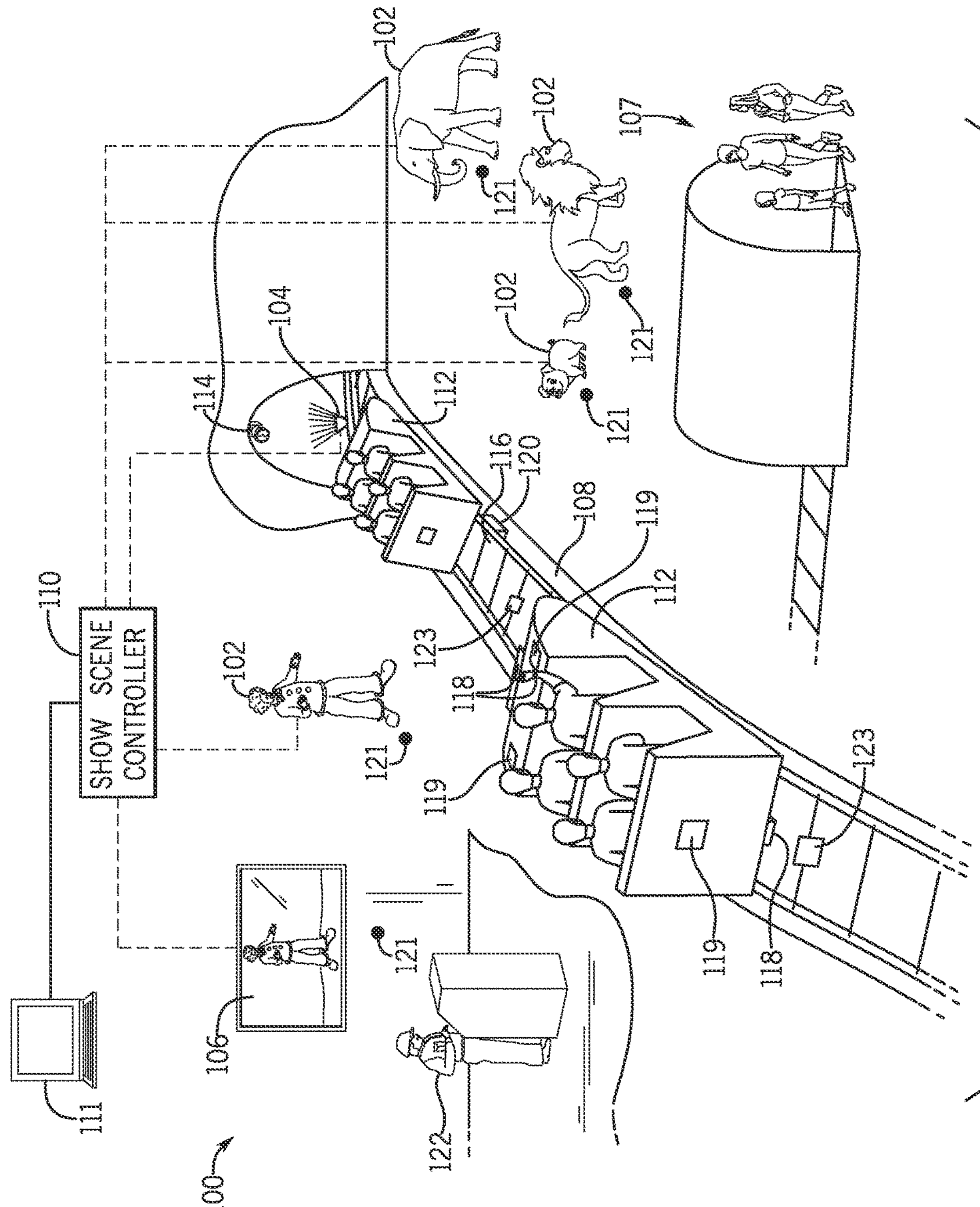
100
102
102
102
102
104
106
107
108
110
SHOW SCENE CONTROLLER
111
112
112
114
116
118
118
119
119
119
120
121
121
121
121
121
122
123
123

FIG. 1

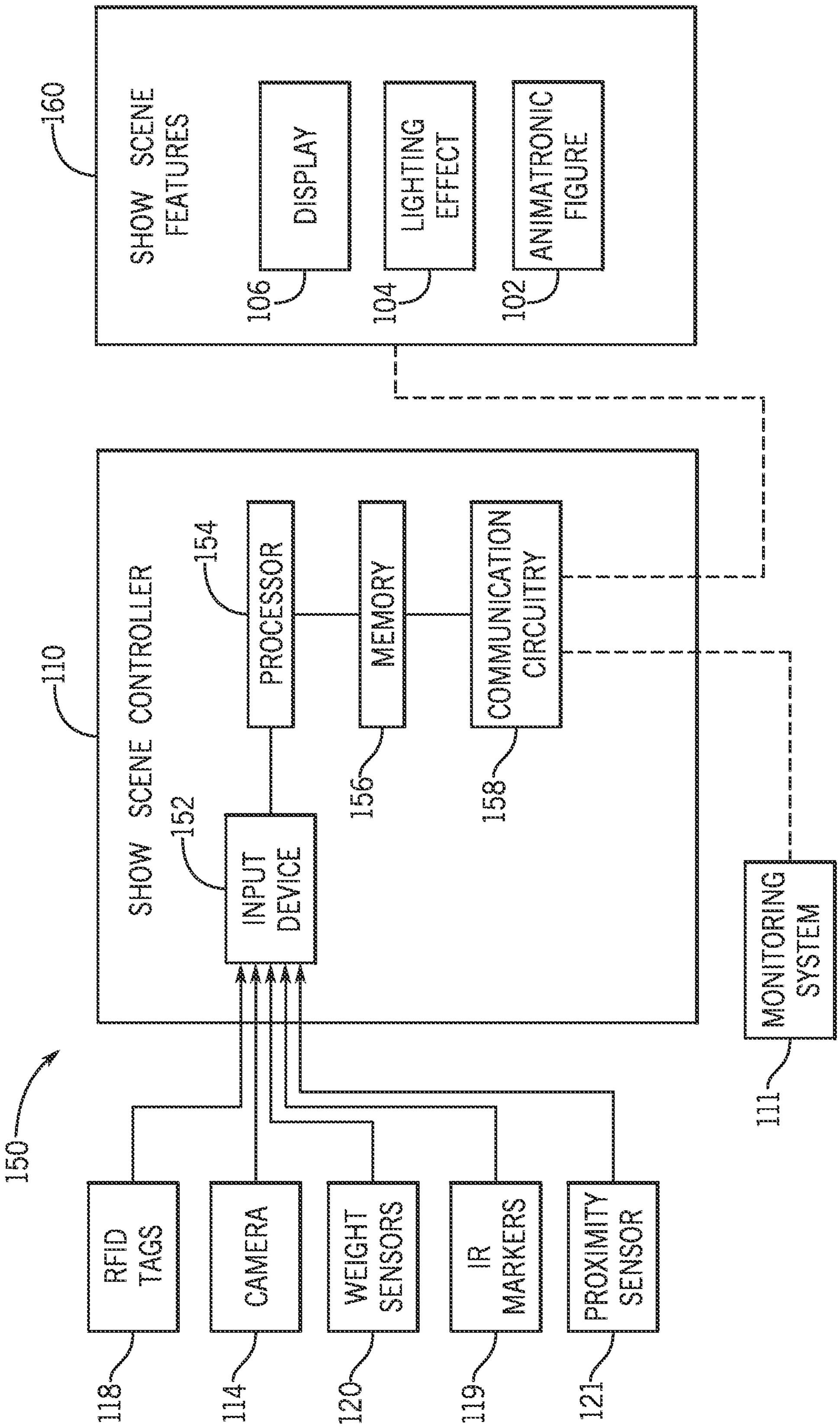
160
SHOW SCENE FEATURES
106
DISPLAY
104
LIGHTING EFFECT
102
ANIMATRONIC FIGURE
110
SHOW SCENE CONTROLLER
154
PROCESSOR
MEMORY
156
COMMUNICATION CIRCUITRY
158
152
INPUT DEVICE
MONITORING SYSTEM
111
150
RFID TAGS
118
CAMERA
114
WEIGHT SENSORS
120
IR MARKERS
119
PROXIMITY SENSOR
121

FIG. 2

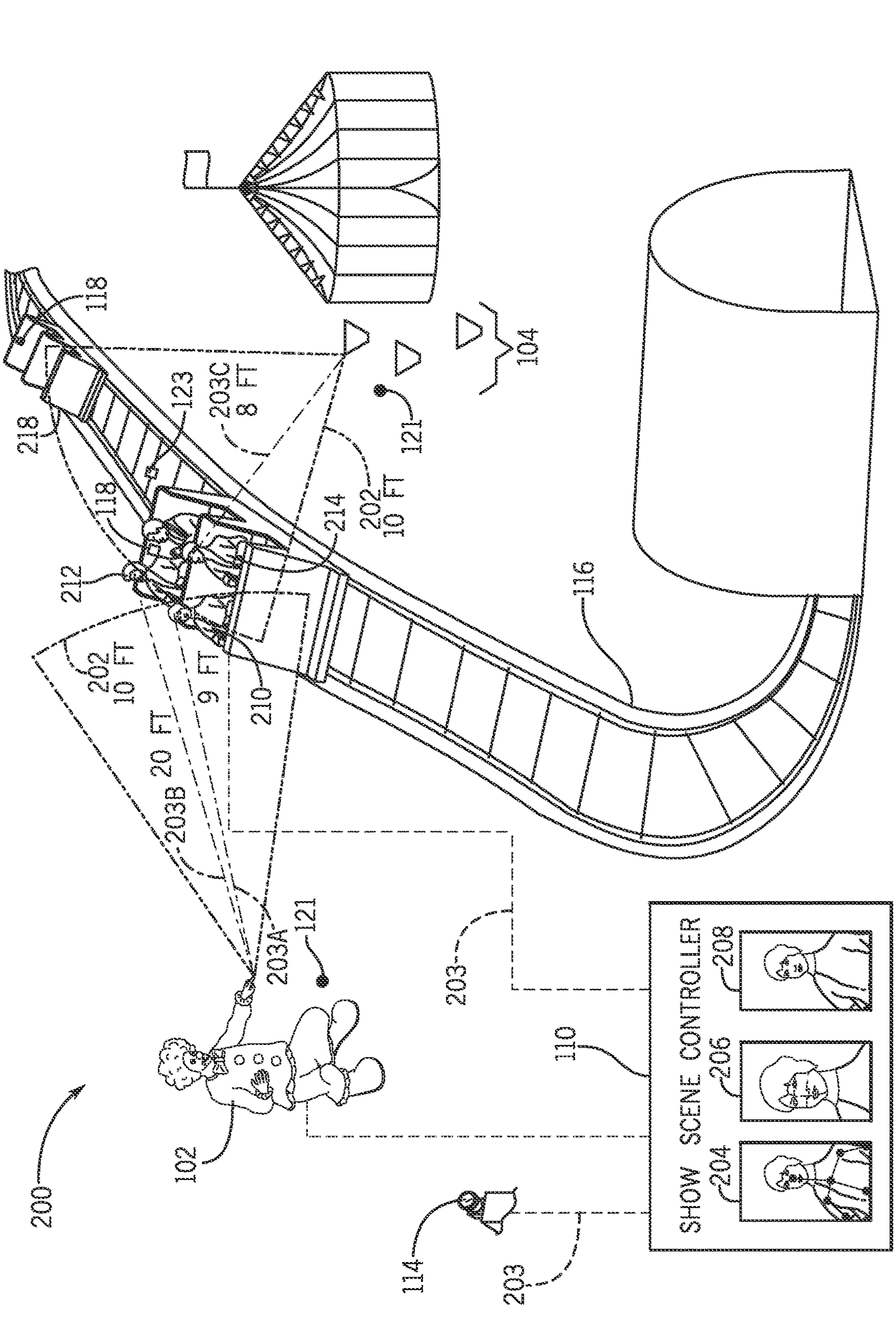
200
102
114
203
110
SHOW SCENE CONTROLLER
204
206
208
121
203A
203B
20 FT
202
10 FT
9 FT
210
212
214
118
218
123
203C
8 FT
104
116

FIG. 3

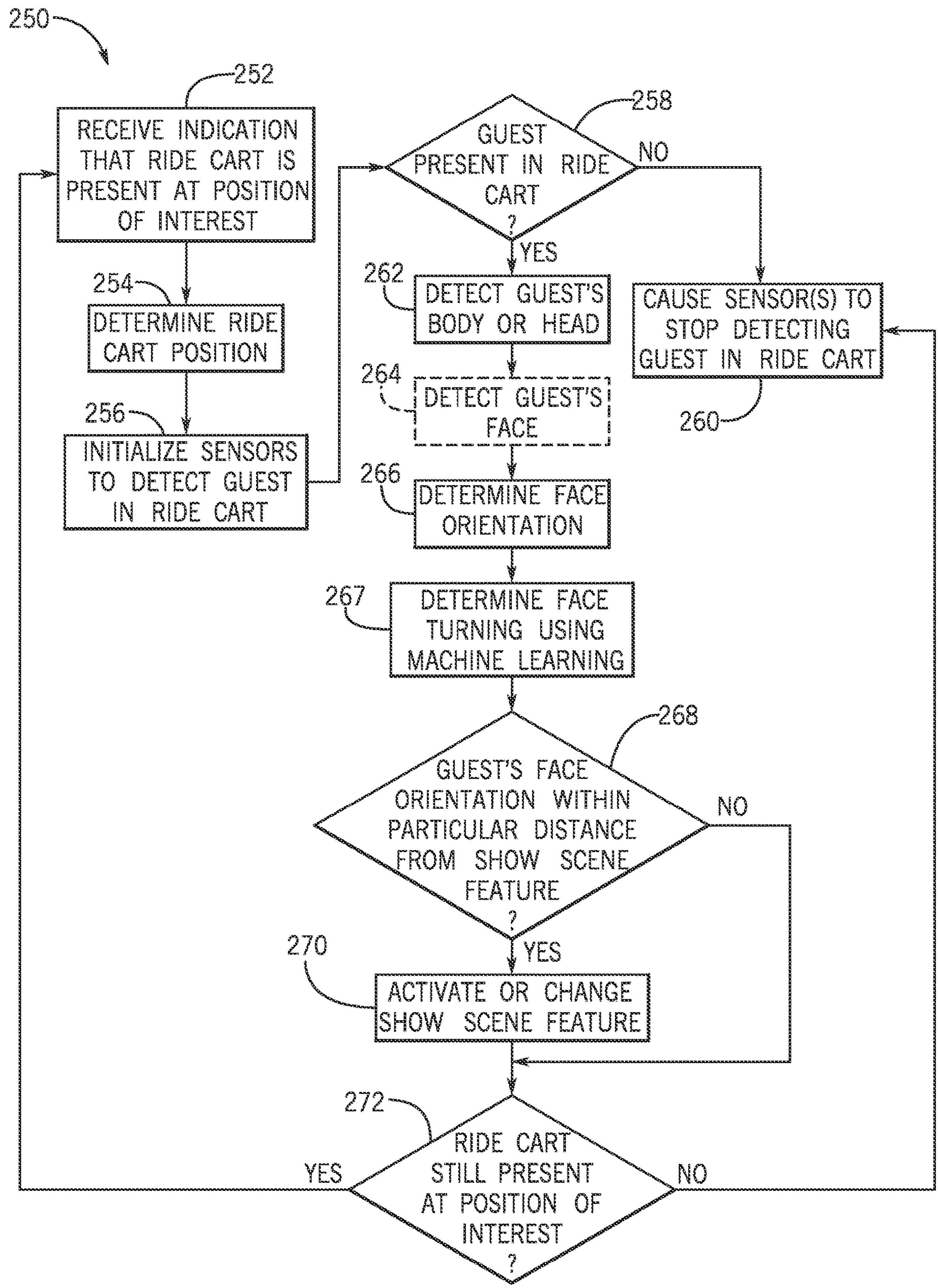
250
252
RECEIVE INDICATION THAT RIDE CART IS PRESENT AT POSITION OF INTEREST
254
DETERMINE RIDE CART POSITION
256
INITIALIZE SENSORS TO DETECT GUEST IN RIDE CART
258
GUEST PRESENT IN RIDE CART ?
NO
YES
262
DETECT GUEST'S BODY OR HEAD
264
DETECT GUEST'S FACE
266
DETERMINE FACE ORIENTATION
267
DETERMINE FACE TURNING USING MACHINE LEARNING
CAUSE SENSOR(S) TO STOP DETECTING GUEST IN RIDE CART
260
268
GUEST'S FACE ORIENTATION WITHIN PARTICULAR DISTANCE FROM SHOW SCENE FEATURE ?
NO
YES
270
ACTIVATE OR CHANGE SHOW SCENE FEATURE
272
RIDE CART STILL PRESENT AT POSITION OF INTEREST ?
YES
NO

FIG. 4

OBJECT ORIENTATION DETECTION SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 17/081,817, entitled "OBJECT ORIENTATION DETECTION SYSTEM," filed on Oct. 27, 2020, which continuation of U.S. patent application Ser. No. 16/277,049, entitled "OBJECT ORIENTATION DETECTION SYSTEM," filed on Feb. 15, 2019, each of which is incorporated herein by reference in its entirety for all purposes.

BACKGROUND

The present disclosure relates generally to the field of camera-based object detection. More specifically, embodiments of the present disclosure relate to systems and methods to identify object orientation using cameras.

In many instances, it may be useful to understand an orientation of an object. Traditionally, wearable devices or other known features of objects have been used to help facilitate orientation detection of objects. However, provision and utilization of wearable devices may be costly and cumbersome. Further, known features may vary from object to object and, thus, may be hard to detect and use as a reference.

For example, many amusement park-style rides include ride vehicles that carry passengers along a ride path, for example, defined by a track. Over the course of the ride, the ride path may include a number of features, including tunnels, turns, ascents, descents, loops, and so forth. The ride path may also include show scene features, such as lighting effects, animated figures or robotic figures that may provide supplemental content and/or enhance an immersive experiences for guests. However, due to the complexity of some amusement rides, determining a guest's body and/or face orientation within the ride, such as to activate or deactivate show scene features along the ride path when the guest is viewing the features, may be difficult without the use of guest wearable ride gear. Nevertheless, providing wearable ride gear may be costly and require additional time to implement as opposed to amusement park-style rides that do not use such gear.

SUMMARY

Certain embodiments commensurate in scope with the originally claimed subject matter are summarized below. These embodiments are not intended to limit the scope of the disclosure, but rather these embodiments are intended only to provide a brief summary of certain disclosed embodiments. Indeed, the present disclosure may encompass a variety of forms that may be similar to or different from the embodiments set forth below.

Embodiments described herein are related to a system that may track face orientation and future face rotation of guests on amusement park rides. In some embodiments, the system may use a ride cart orientation on the ride in conjunction with skeletal tracking to determine the face orientation and rotation. In other embodiments, the system may use facial and/or body image detection to determine facial features along with face orientation and rotation. Moreover, machine learning may be used when determining a face orientation based on reoccurring determinations.

Though the discussion below primarily focuses on amusement park-style rides, this is not intended to limit the scope of the current invention. Indeed, the current object orientation detection system can be used in a number of different applications wholly different from amusement park-style rides.

In an embodiment, a face orientation system of a ride includes one or more sensors and a controller. The controller receives ride cart data from the one or more sensors indicative of a presence and position of the ride cart on the ride, determines a ride cart orientation based on the ride cart data, receives position data of a guest from the one or more sensors indicative of a position of a body, a face, or a combination thereof, of the guest, determines face orientation, face rotation, or a combination thereof, of the guest based on the ride cart orientation and position data, and transmits data indicative of the determined face orientation, face rotation, or a combination thereof to a downstream controller for subsequent control based upon the determined face orientation, face rotation, or the combination thereof.

In an embodiment, a method includes receiving ride cart data from one or more sensors indicative of a presence and position of a ride cart on a ride, determining a ride cart orientation based on the ride cart data, receiving position data of a guest from the one or more sensors indicative of a position of a body, a face, or a combination thereof, of the guest, determining face orientation, face rotation, or a combination thereof, of the guest based on the ride cart orientation and position data, and transmitting data indicative of the determined face orientation, face rotation, or a combination thereof to a downstream controller for subsequent control based upon the determined face orientation, face rotation, or the combination thereof.

In an embodiment, a tangible, non-transitory machine readable medium includes machine-readable instructions that when executed by one or more processors of the machine, cause the machine to: receive ride cart data from one or more sensors indicative of a presence and position of a ride cart on a ride, determine ride cart orientation based on the ride cart data, receive position data of a guest from the one or more sensors indicative of a position of a body, a face, or a combination thereof, of the guest, determine face orientation, face rotation, or a combination thereof, of the guest based on the ride cart orientation and position data, and transmit data indicative of the determined face orientation, face rotation, or a combination thereof to a downstream controller for subsequent control based upon the determined face orientation, face rotation, or the combination thereof.

BRIEF DESCRIPTION OF DRAWINGS

These and other features, aspects, and advantages of the present disclosure will become better understood when the following detailed description is read with reference to the accompanying drawings in which like characters represent like parts throughout the drawings, wherein.

FIG. **1** is a block diagram of an amusement park ride including an attraction with a show scene along a ride path, in accordance with an embodiment of the present disclosure;

FIG. **2** is a schematic diagram of a face orientation system including a show scene controller used to control show scene features, in accordance with an embodiment;

FIG. **3** is a block diagram of the face orientation system of FIG. **2** using skeletal tracking to determine a face orientation, which is subsequently used to control an animated figure, in accordance with an embodiment; and

FIG. **4** is a process flow diagram of determining a guest's face orientation, in accordance with an embodiment.

DETAILED DESCRIPTION

One or more specific embodiments of the present disclosure will be described below. In an effort to provide a concise description of these embodiments, all features of an actual implementation may not be described in the specification. It should be appreciated that in the development of any such actual implementation, as in any engineering or design project, numerous implementation-specific decisions must be made to achieve the developers' specific goals, such as compliance with system-related and business-related constraints, which may vary from one implementation to another. Moreover, it should be appreciated that such a development effort might be complex and time consuming, but would nevertheless be a routine undertaking of design, fabrication, and manufacture for those of ordinary skill having the benefit of this disclosure.

When introducing elements of various embodiments of the present disclosure, the articles "a," "an," and "the" are intended to mean that there are one or more of the elements. The terms "comprising," "including," and "having" are intended to be inclusive and mean that there may be additional elements other than the listed elements. Additionally, it should be understood that references to "one embodiment" or "an embodiment" of the present disclosure are not intended to be interpreted as excluding the existence of additional embodiments that also incorporate the recited features.

Amusement parks feature a wide variety of entertainment, such as amusement park rides, performance shows, and games. The different types of entertainment may include show scene features, such as a themed scene along a ride path, that enhance a guest's experience at the amusement park. The show scene features may include effects, objects, or equipment along the ride path that are activated while guests are viewing the particular show scene. For example, a robotic figure along a ride path may include elements or objects that change or activate based on the detected presence of a cart and/or guest along the ride path. The show scene changes may include variations in animated equipment and changes in lighting, positioning of the ride cart, etc.

Typical show scene features (e.g., lighting, animations) activation may be triggered by limited information about an attraction and/or a guest viewing the show scene object along the ride path. For example, the trigger may be based on the positioning of a ride cart and/or guest. Thus, regardless of the guest positioning within the ride cart, the show scene features provided on the ride path may be turned on. This may result in a less personalized experience that is generically implemented for each iteration of the attraction.

However, it may be desirable to provide more granular triggers that provide more customized attraction changes based upon particular features of the attraction guests. Provided herein are techniques that facilitate the determination of a guest's face orientation and face turning while on a ride without the use of guest face or head gear while on the ride. The determination of a guest's face orientation and turning may be used to trigger or initialize show scene features. For example, show scene features, such as animations or special effects, may be provided in response to a guest's face oriented to be within a viewing range of a particular object or equipment on the ride path that provides the show scene feature. Generally, a ride cart moves along the ride path with a guest's body or head moving and turning to view features along the ride path. Effects and animations may be triggered to initialize in response to a detection of an active ride cart on the ride. However, providing precise guest's face orientation and face turnings at a particular position on the ride path, such as within a viewing range of objects or equipment that provide special effects or animations on the ride, may be complex.

It should be noted that although examples provided herein may be presented generally in an amusement park and ride attraction context, such as using the present guest face orientation determination techniques to facilitate activating features in a show scene on a ride path, the techniques in this disclosure may be applied to other non-amusement park related conditions and/or contexts. Thus, the present examples should be understood to merely reflect a real-world example of a face orientation system on rides in order to provide useful context for the discussion, and should not be viewed as limiting the applicability of the present approach. Instead, the present approach should be understood as being applicable to any situation in which precise orientation of moving (e.g., face turning) people or objects may be determined within in an environment for business purposes, entertainment purposes, etc.

With the foregoing in mind, FIG. **1** is a block diagram of an amusement park ride **100** that may operate in conjunction with the disclosed face orientation system in accordance with the present embodiments. In particular, the amusement park ride **100** may include one or more ride carts **112** with or without guests, and a show scene feature along a ride path **108** that includes animated FIGS. **102**, the lighting effects **104**, and displays **106**. The show scene features may be activated to change based on a detected ride cart **112** orientation in conjunction with a riding guest's face orientation and/or head turning.

As depicted, the show scene features, such as the animated FIGS. **102**, the lighting effects **104**, and the display **106**, may be controlled to react via a show scene controller **110**. In an embodiment, the show scene controller **110** of a face orientation system may be centralized and synced to at least one or more show scene features located throughout the ride path **108** of the amusement park ride **100** to control the one or more show scene features. The show scene controller **110** receives contextual positioning information (e.g., the ride cart **112** position and guest body and/or head position data) via one or more sensors and/or processors located on or around the show scene features, the ride cart **112**, and/or the ride path **108**. Using this information, face orientation may be determined by the face orientation system, as described in detail in FIG. **2**.

Once the face orientation is determined, a control signal may be sent to the one or more systems controlling the show scene features to trigger one or more of the show scene features based upon the face orientation. The contextual positioning information (e.g., sensed data indicating the ride cart **112** position on the ride track **116** and guest body and/or head position) may also be sent to a monitoring system **111**. The monitoring system **111** may be an administrative system that not only monitors the show scene changes, such as animation or lighting control signals sent from the show scene controller **110** in response to the ride cart **112** orientation and face orientation, but may also control or reconfigure the show scene controller **110**. In this manner, the monitoring system **111** may reset show scene feature changes or override animations and effects determined by the show scene controller **110**. For example, the show scene controller **110** may automatically send an animation to the animated FIG. **102** in response to a guest facing the animated FIG. **102**, as discussed in detail in FIG. **2**. Similarly, a ride operator **122** may manually stop an animation via a stopping mechanism (e.g., button) to override the animation if the ride operator **122** finds any issues with the animated FIG. **102** beyond those determined by the show scene controller **110**. The monitoring system **111** may also be used to recalibrate sensors on or around the show scene. Moreover, the monitoring system **111** may be used to reset face orientation determination algorithms of the show scene controller **110**. In certain embodiments, the monitoring system **111** and the show scene controller **110** may be implemented as a single controller.

As previously mentioned, the show scene controller **110** of the face orientation system may utilize a combination of sensor data received by sensors on or near show scene features, data from the ride cart **112**, and/or the ride path **108** to detect positioning of the ride cart **112** and a guest's body/head, and to further determine face orientation, alignment, and/or estimate face rotation. The determination may be used to correspondingly control animations and effects produced throughout the show scene. Based on the orientation of the ride cart **112**, a 3D map of a guest on the ride may be generated. The 3D map generation may be based on a known ride track **116** position and orientation, and known features within the ride **100** (e.g., the ride track **116** turns towards a show scene feature at a midpoint on the ride **100**). For example, the 3D map may generate the ride cart's **112** orientation based on the ride track **116** positioning. Moreover, guest position data within the 3D map may be based on the ride cart **112** orientation and a known ride cart **112** structure (e.g., seats are forward facing as the ride cart **112** moves along the ride path **108**). The 3D map may be used to reconstruct a 3D position of the guest and then accurately determine a face orientation, especially relative to known show scene features within the ride path **108**. The 3D map may also determine where a head may be turning, such as to face show scene features that are expected to be viewed by the guest based on determined face orientation. Moreover, machine learning may be used to accurately predict a face position based on reoccurring determinations that are made using sensor data. Machine learning may further be used to predict face orientation based on learned face orientation of a guest during a specific point on the ride path **108** (e.g., face often positioned towards a particular show scene feature).

As shown, the ride cart **112** may be detected using radio frequency identification (RFID) tags **118** incorporated into the ride cart **112** or a guest wearable device, weight sensors **120** along the ride track **116**, and/or the infrared (IR) markers **119** located on the ride cart **112**. The RFID tags **118** may communicate with an electronic reader **123** incorporated at different places on the ride **100**, such as on the ride track **116**, to indicate presence of the tag. Thus, the electronic reader **123** placed on the ride path **108** may scan the RFID tag **118** on the ride cart **112** as the ride cart **112** passes over the electronic reader **123**. Moreover, the RFID tags **118** may be placed at specific areas of the ride cart **112** and/or be different types of the RFID tags **118**. In this manner, the RFID tag **118** placement and/or type may be used to determine the front and back of the ride cart **112**. This information may be used to more accurately predict the position of a guest within the ride cart **112**, such that faces may be predicted to be facing towards the front of the ride cart **112**. Similarly, the IR markers **119** may also be placed on the ride cart **112**. The IR markers **119** may include an IR reflective surface that may be optically invisible but that may be detected by one or more cameras **114**. The cameras **114** may be equipped to detect IR radiation reflected from the marker. Moreover, the RFID tags or IR markers may be periodically placed on the ride track **116** or the ride path **108** at particular intervals or specific points of interest on the track. The cameras **114** that may be used to detect the ride cart **112** and/or guest's body and/or head positions, may be configured to activate after the ride cart **112** is approaching a particular camera's viewing range, thereby conserving power. Similarly, tracking the ride cart **112** at specific points on the ride track **116** may be used to activate or deactivate show scene features along the ride path **108**. By way of example, the RFID tags **118** may indicate that the ride cart **112** is at the beginning of its journey and thus, show scene features located towards the end of the journey may be turned off. As the ride cart **112** approaches closer to a point of interest on the ride **100**, such as a predetermined distance (e.g., 3 meters) to specific show scene features that may be determined using proximity sensors **121** or based on the 3D map, the show scene controller **110** may activate such features accordingly. Additionally or alternatively, the RFID tags **118** or the IR markers **119** may be placed such that the position of the ride cart **112** on the track (e.g., straight track or turning) may be determined.

Furthermore, guest wearable devices may also include the RFID tags **118** or the IR markers **119**, which may be used to indicate guest presence in the ride cart **112** and further trigger face orientation determinations. By way of example, the electronic reader **123** for the guest wearable device may be placed on the seat of the ride cart **112** and indicate guest presence when scanned. Additionally or alternatively, the IR markers **119** on the guest wearable device may be detected by cameras using techniques previously described.

Weight sensors **120** may also be mounted on the ride track **116** to indicate presence of the ride cart **112** on the ride track **116** based on passing a predetermined weight threshold. After determining the ride cart **112** position using the techniques described above (e.g., the RFID tags **118**, the IR markers **119**) to generate the 3D map, the cameras **114** may view the area of interest, such as the position and/or location of the ride cart **112** within the ride path **108**. Thus, capturing guest body and/or head position data may be limited to guests on the ride cart **112**. Furthermore, since seat positions of the ride cart **112** may be known to the ride operator **122**, the cameras **114** may be configured to narrow the viewing range to focus on a particular area around the seats. Thus, guest positioning may be determined by the ride cart **112** position and other sensor mechanisms as described herein, to precisely determine face orientation. Furthermore, the face orientation may be used to determine viewing direction within the ride path **108**.

As shown, the cameras **114** or a series of cameras **114** may be installed along the ride path **108** and throughout the amusement park ride **100** to determine one or more guests' body and/or head orientation. Although an array of cameras **114** are shown and discussed herein to detect guest orientation, a single camera **114** may be used. Moreover, in some embodiments, the single camera **114** may be used to determine the ride cart **112** positioning and orientation used to generate the 3D map in addition to or alternative to the techniques previously described.

The cameras **114** may be set up at a predetermined distance from show scene features, such as from the animated FIGS. **102**, the lighting effects **104**, and the displays **106**. Depending on the show scene feature, the predetermined distance may be a distance that may allow capturing a guest head and at least top half of the body, such as to allow precise determination of the head orientation (e.g., front of head, back of head, facing towards show scene feature). For example, the cameras **114** may view a 3 meters circumference around the animated FIG. **102**. In this manner, any guests on the ride cart **112** near the animated FIG. **102** may be easily detected. Additionally or alternatively, the cameras **114** may be integrated into the show scene feature, such as the body of the animated FIG. **102**. The integration may be positioned to allow a clear view of one or more guests to be perceived, whether the guests are stationed in front of or have past the animated FIG. **102** while in the ride cart **112**. For example, integrating the cameras **114** into the eyes of the animated FIG. **102** may allow for detection of guests in front of it. Additionally or alternatively, the predetermined distance may not be uniform for all show scene features depending on the intended effect on the guest. By way of example, the lighting effects **104** along the ride path **108** may be switched on prior to the ride cart **112** and/or guests to be positioned in front of it. Thus, the one or more cameras **114** may determine guest presence at a further distance than for the animated FIG. **102**. Moreover, the cameras **114** may be positioned in a manner that may allow excluding a view that may not include the guest of interest. For example, and as depicted, the ride operator **122** may operate the ride, such that guests waiting in a queue **107** for the ride **100** are signaled to enter the ride cart **112**. Since the ride operator **122** and the guests in queue **107** are not on the ride **100** or in the ride cart **112**, their face orientation relative to the show scene may not be of interest, and thus, excluded from the cameras **114** viewing range.

The cameras **114** may also be used to capture data used as inputs to one or more processes of the face orientation system as provided herein. In one example, the cameras **114** data may be used by the show scene controller **110** to detect a human body. That is, additionally or alternatively to generating a 3D map of the ride cart **112**, the presence of the captured image may be used to determine the presence and positioning of any guests on the ride cart **112**, and further determine face orientation. Skeletal tracking, is used at least in part to further determine guest body and/or face position on the ride cart **112**. Skeletal tracking may include using real-time or captured images of guests on the ride cart **112** by the cameras **114**, and comparing the images to recognized skeletal models to indicate a human skeleton detection. For example, the skeletal model may include relative positioning of essential joints, bones, and limbs of a human skeleton. Joints located closer together on the skeletal model may indicate that the body and/or face is turned towards the particular direction. Moreover, the skeletal model may be used to predict the guest's face orientation in the future based on present face and body positions. For example, if the skeletal model indicates that a face orientation is forward facing but the body is turned slightly right based on body and face joint positioning (e.g., shoulder joints closer together towards the right end of skeletal body), the face orientation may be predicted to also turn right. Moreover, the ride cart **112** data that indicates particular show scene features at points along the ride path **108** may be used in conjunction with the skeletal tracking to make future face rotation predictions (e.g., face likely to turn towards a known show scene feature). Thus, comparing captured images of guests and the skeletal model may be used for guest detection and body/face orientation. In some embodiments, a range of face rotation may be defined based upon the ride cart **112** orientation and/or the body orientation. For example, a typical guest may rotate their head a maximum head rotation (e.g., 90 degrees) in either direction respective to a known base orientation. Assuming that the user is facing forward in the ride cart **112**, the ride cart **112** orientation may be used as the known base orientation to define the range of face rotation. Additionally or alternatively, if the guest's body orientation is known, this can also be used as the known base orientation to define the range of face orientation. By way of example, when using the ride cart **112** orientation as the known base orientation and the ride cart **112** orientation is 45 degrees, the guest's range of face rotation may be defined as the known base orientation plus or minus the maximum head rotation. Here, the guest's range of face rotation would be 45 degrees plus or minus 90 degrees, resulting in a range of −45 to 135 degrees. Similar calculations may be made using the guest's body orientation as the known base orientation.

In some embodiments, fast pace rides **100** may use less granular analysis of face orientation and may use skeletal tracking and the ride cart **112** data to determine face orientation. By way of example, the ride cart **112** orientation determination using the techniques previously described (e.g., known front and back of the ride cart **112**, the ride path **108**, the ride track **116**, and the show scene features **110** on the ride path **108**) may indicate a probable body positioning of a guest based on the ride cart **112** orientation and any show scene features along the ride path **108** that the guest may view. Thus, the ride cart **112** data may indicate the guest's general position within the ride cart **112** and relative position to a show scene feature that may be located along the ride path **108**. Moreover, a skeletal model from skeletal tracking may further provide accurate body and face orientation of the guest. The positioning of joints closer together towards one end of the skeletal model may indicate that the guest is turned in the same direction as the show scene feature along the ride path **108**. Thus, the ride cart **112** data in conjunction with skeletal tracking may be used for face orientation determinations.

On the other hand, slower pace rides **100** may use relatively more granular analysis of face orientation, such as to include a facial feature analysis. However, a skeletal image provided by skeletal tracking may not indicate precise facial features. Thus, the skeletal image data may be further processed to identify faces using facial recognition and/or body shapes using body recognition.

In some embodiment, such as for slower pace rides **100**, facial image detection may consider multiple facial features as a whole to determine that a face has accurately been detected. The features considered may be points of facial interest and their intersection (e.g., two eyes aligned along a horizontal line in close proximity to a nose along a vertical line, detected at or near a point between each eye). Furthermore, the cameras **114** may be used for full body detection or upper body detection depending on the cameras **114** viewing range, such that body features may be used to precisely identify a guest orientation (e.g., guest facing forward). For example, the body detection features may consider body features and their intersection, such as face, arms, and legs. Body detection may further indicate the orientation of a guest's body and predict the guest's face orientation and/or future face orientation. By way of example, if a guest's face is detected to be facing forward but the body is detected to be turned slightly right, the face orientation may be predicted to also turn right. Additionally or alternatively, the ride cart **112** data indicating the ride cart **112** position on the ride path **108** and relative position to a show scene feature, may be used in conjunction with body and/or facial image detection to predict future orientation of a face rotation. Moreover, the cameras **114** may be used for thermal recognition to detect body-heat, which may be used to further accurately predict presence and orientation of a guest. Furthermore, the cameras **114** may also include infrared (IR) capabilities, such that the camera may provide night vision, thereby detecting guests in both the day and night. The IR capabilities may also be used for the IR makers to detect the ride cart **112**, as discussed above.

Some of the different types of sensors, such as the RFID tags **118**, the IR markers **119**, and/or the cameras **114** input used to detect the ride cart **112** positioning within the ride **100** to generate the 3D map, may be used in conjunction with additional camera **114** input used to determine a guest's body and/or face, such as by skeletal tracking. Thus, based on the detection of a present ride cart **112** at a particular position within the ride **100**, the cameras **114** may be initialized for skeletal tracking, body detection, and/or facial detection to determine face orientation. In certain embodiments, after determining the face orientation of a guest, show scene features may be initialized to provide entertainment to the guest facing the feature within a predetermined range. That is, if a sensed distance is less than a threshold and/or if the guest is within a hypothetical field of view of a show scene feature, and the guest is determined to be facing the feature, animations or effects may be triggered.

As previously mentioned, after determining the ride cart **112** positioning in conjunction with the guest's body and/or head positioning used to determine a guest's face orientation (e.g., face is rotated right relative to the body), algorithms of the face orientation system may be modified based on machine learning. Specifically, face orientation determination algorithms may be changed in response to ongoing or periodic determinations. By way of example, if a face orientation of a guest is determined to be positioned towards a show scene feature at a particular point on the ride path **108**, then the show scene controller **110** may learn via machine learning to predict a face orientation at the same position. Similarly, if a face orientation is determined to be forward facing at particular points on the ride path **108**, then the show scene controller **110** may make similar predictions using machine learning. Moreover, machine learning may be used for predicting face rotations as faces are determined to rotate at particular points on the ride path **108**. Thus, machine learning may be used to identify a pattern of face orientations and future rotations for the show scene controller **110** to make accurate face orientation determinations and predictions. In accordance with certain aspects discussed herein, machine learning approaches that may be used to make predictions related to face detection and orientation, such as expected turning of a face, may further be used to accommodate a show scene animation or effect performed. Based on the face orientation determinations using detection mechanisms (e.g., the IR markers **119** to detect the ride cart **112**, skeletal tracking and/or facial recognition to detect a face), machine learning may update or modify face orientation algorithms based on updated data, through performing detections and configuration changes, or through other suitable approaches.

As previously mentioned, the combination of detected sensor data indicative of the ride cart **112** orientation and/or guest positioning within the 3D map of the ride **100**, may be sent to a show scene controller **110** of the face orientation system. The face orientation system may then use the sensor data to determine a face orientation and subsequently determine any changes to show scene features. To illustrate, FIG. **2** shows a block diagram of a face orientation system **150** with a show scene controller **110** used to control show scene features **160**, which may include the display **106**, the lighting effect **104**, and the animated FIG. **102**. The show scene controller **110** (e.g., electronic controller) may include a memory **156**, a processor **154**, a communication circuitry **158**, and an input device **152**. In certain embodiments, the memory **156** is configured to store instructions, data, and/or information, such as a database of images, animations, or effects for the show scene features. Additionally or alternatively, the memory **156** may include a user-defined algorithm for generating a 3D map of the ride cart **112** within the ride and an algorithm for determining face orientation. It should be noted that although examples provided herein may explicitly depict and describe the show scene features as limited to the display **106**, the lighting effect **104**, and/or the animated FIG. **102**, the approaches disclosed may include using face orientation to control other show scene features or effects on the ride path **108**, such as changing the ride track **116** path.

As discussed in more detail below, in certain embodiments, the processor **154** is configured to receive inputs signals from the input device **152** relating to detecting the ride cart **112** position and/or guest's orientation from one or more sensors previously described, which may then be used to determine face orientation using techniques described herein. Subsequently, an image, effect, or animation from the database may be provided based on the determined face orientation and guest positon within the ride, in accordance with the position of the ride cart **112**. In this manner, the show scene controller **110** may determine face orientation and further control the show scene features accordingly when a guest is within a predetermined range of a particular show scene feature and/or when the guest's face is determined to be oriented toward the particular show scene feature. The sensor data may be provided to the input device **152** by the camera(s) **114**, the weight sensor(s) **120**, the IR markers **119**, the RFID tags **118**, and/or the proximity sensor(s) **121**, as previously described. It should be understood that the illustrated system is merely intended to be exemplary, and that certain features and components may be omitted and various other features and components may be added to facilitate performance, in accordance with the disclosed embodiments.

Based on the received sensor data to the input device **152**, the show scene controller **110** may facilitate control of the show scene features **160** using the processor **154** to select images to be displayed, animations to be implemented, and special effects that may be stored in a database of the memory **156**. The database may include, for example, a list of available images, such as images related to the theme of the ride. By way of example, the ride **100** of FIG. **1** depicts a circus theme, and thus, circus images may be displayed on the display **106** when a guest face is facing the display **106**. The database may also include animations to be performed by the animated FIG. **102** (e.g., clown). Continuing with the circus theme example, animations may include, but are not limited to, juggling, laughing and waving, saying a greeting, etc. Furthermore, the lighting effect **104** options may include colored lighting, strobe lighting, shadow lighting, and/or lighting to create circus related images displayed throughout the ride path **108** (e.g., tunnel wall on the ride path **108**).

In the depicted embodiment, the processor **154** of the show scene controller **110** may execute instructions stored in the memory **156** to perform operations, such as generating the 3D map, determining face orientation based on the sensor data received at the input device **152**, and selecting or changing the show scene features **160** (e.g. cause the animated FIG. **102** to juggle when a detected face is oriented towards the animated FIG. **102**). As such, in some embodiments, the processor **154** may be one or more general purpose microprocessors, one or more application specific processors (ASICs), one or more field programmable logic arrays (FPGAs), or any combination thereof. Additionally, the memory **156** may be a tangible, non-transitory, computer-readable medium that stores instructions executable by and sensor data to be processed by the processor **154**. Thus, in some embodiments, the memory **156** may include random access memory (RAM), read only memory (ROM), rewritable non-volatile memory, flash memory, hard drives, optical discs, and the like.

Furthermore, the show scene controller **110** may enable the communication circuitry **158** to interface with various other electronic devices, such as the monitoring system **111**. The monitoring system **111** may use the generated 3D map and/or face orientation determinations for further analysis (e.g., to update the 3D map algorithm). Additionally or alternatively, the show scene controller may enable the communication circuitry **158** to interface with components of the show scene features **160**. For example, the communication circuitry **158** may allow the show scene controller **110** to communicatively couple to a network, such as a personal area network (PAN), a local area network (LAN), and/or a wide area network (WAN). Accordingly, in some embodiments, the show scene controller **110** may process data from the input device **152**, determine face orientation and position of guests within the 3D map, determine changes (e.g., animations or effects) to be implemented, and communicate the changes to the show scene features **160** via the communication circuitry **158**. For example, after processing sensor data inputs from the input device **152**, the processor **154** may determine a control signal that enables the communication circuitry **158** to wirelessly transmit control data to the show scene features **160** to enable activation of the changes. In other embodiments, the communication circuitry **158** may be connected via a wired connection to the show scene features **160**.

In some embodiments, once the control signal is sent from the show scene controller **110** to the show scene features **160**, the show scene features **160** may execute the corresponding change, such as an animation implemented by the animated FIG. **102**, an image to be displayed on the display **106**, or producing a visual effect with the lighting effects **104**. Additionally, although not explicitly shown, components used to implement changes in the display **106**, the lighting effect **104**, and/or the animated FIG. **102**, may include a respective processor, a respective memory, a respective communication device, and one or more actuators.

FIG. **3** is a block diagram **200** of an embodiment of use of the face orientation system **150** used to detect face orientation using skeletal tracking and facial recognition, that is subsequently used to control the animated FIG. **102**, in accordance with aspects of the present disclosure. The depicted embodiment may include the animated FIG. **102** changing or interacting with guests when the guests are facing or looking at it. As shown, the cameras **114** are positioned to view both the ride cart **112** and guests that may come within a particular range or distance **202** of the animated FIG. **102** (e.g., as estimated by a proximity sensor **121** or the 3D map) in the show scene that may trigger animation of the animated FIG. **102** when the guests are facing the animated FIG. **102**. The sensed data **203** provided by the cameras **114** and/or sensors, such as the depicted RFID tag **118**, may be communicated to the show scene controller **110**. Based on the RFID reading by the electronic reader **123**, the one or more cameras **114** may be initialized or turned on to detect orientation of the ride cart **112** and face orientation. As previously discussed, an array of strategically placed ride cart **112** presence sensors (e.g., the RFID tags **118**) throughout the ride **100** may be used to activate the cameras **114** in sequence or at specific tracked points along the ride **100** in order to preserve power.

In the present embodiment, sensed data **203** may be sent to the show scene controller **110** to indicate that the RFID tag **118** associated with the ride cart **112** passes the electronic reader **123**, which may indicate the expected location of the ride cart **112** on the ride track **116**. This determination may indicate the position of the ride cart **112** on the ride track **116**, such as the ride cart **112** is positioned slightly left based on a known ride track **116** arrangement. The determination may be based on multiple electronic readers **123** that are placed throughout the ride track **116** such that each electronic reader **123** indicates a respective point on the ride track **116**. By way of example, a particular electronic reader **123** may indicate a midpoint on the ride track **116**, and the midpoint may include the ride track **116** that turns, indicating that the ride cart **112** on a turning ride track **116** may also be turning. Moreover, the ride cart's **112** positioning within the ride **100** and the ride track **116** may indicate current or expected position next to the show scene features **160**, such as the animated FIG. **102**. The positioning of the ride cart **112** may provide context for determining the direction that guests may be facing. For example, the ride cart **112** is facing forward or in line with the ride direction, and thus, guests are likely facing forward. Additionally or alternatively, the ride cart **112** position may be determined by generating the 3D map using captured images by the cameras **114** and/or known layout of the ride **100** (e.g., the ride path **108**, the ride track **116**, and the show scene features **160**, etc.)

Once the ride cart **112** positioning has been determined and the cameras **114** are activated, the cameras **114** may focus on the view of the ride cart **112** to detect guest body and/or head position and determine their face orientation. Using different recognition techniques, such as but not limited to, skeletal tracking and/or facial recognition, as previously discussed, the show scene controller may determine face orientation. As depicted, multiple guests may be in the ride cart **112** and the cameras **114** may observe each guest simultaneously or individually. Accordingly, the show scene controller **110** may detect and track the presence of the multiple guests using skeletal tracking to detect skeletal body features, such as a skeletal head and/or body. In some embodiments, a skeletal reading **204** sent to the show scene controller **110** may subsequently trigger face detection. The facial recognition techniques may use the skeletal tracking readings to focus on the skeletal image and find arms, chest, eyes, nose, etc. to generate a facial image **206**. In this manner, the show scene controller may use the ride cart **112** orientation within the ride **100** in conjunction with body/face orientation techniques, as previously described, to determine and generate a face orientation image **208**. Additionally or alternatively, the face orientation image **208** may include additional images indicative of predicted face turns or positioning. Furthermore, the show scene controller **110** may use machine learning to update its face orientation detection determinations and predictions on guests at the particular position within the ride **100** based on reoccurring body and face positions and their resulting face orientation determinations.

Furthermore, the face orientation determination for the one or more guests in the ride cart **112** may be used to initialize or change the show scene features **160**, such as the animated FIG. **102** and the lighting effect **104** in the depicted embodiment. As shown, a first guest **210** and a second guest **212** may be positioned closest to the animated FIG. **102**. Based on the show scene controller **110** predefined settings (e.g., designer or operator defined settings), the animated FIG. **102** may be instructed to react to guests that are within a particular distance **202** (e.g., 3 meter) and facing its direction. Here, although the faces of both the first guest **210** and the second guest **212** are turned to face the animated FIG. **102**, the first guest is within the particular distance **202** for the animated FIG. **102** to interact with the first guest **210** while the second guest **212** is out of range. Specifically, the first guest **210** is in a 3 meter distance **203**A from the animated FIG. **102**, which is within the particular distance **202** of 3 meters. However, the second guest **212** is in a 6 meter distance **203**B from the animated FIG. **102**, and thus, not within the particular distance **202**. Moreover, a third guest **214** is in a 2 meter distance **203**C, which is within the 3 meters particular distance **202** from the lighting effects **104** surrounding a circus tent feature. Although the third guest **214** is within the particular distance **202**, the guest's face is determined to be oriented to the left and away from the lighting effects **104**. Thus, show scene features may be triggered in response to a guest determined to be within the particular distance **202** and facing the show scene feature. Using the face orientation techniques described herein, the show scene features, such as the lighting effects **104**, may conserve power and continue being powered off in response to no guests determined to be facing the show scene feature within the particular distance **202**.

Moreover, in some instances an empty ride cart (e.g., no guests in the ride cart) or a ride cart with fewer than a maximum number of guests may be present. As illustrated in the current embodiment, a subsequent ride cart **218** that is empty follows the ride cart **112** as the carts continue moving forward within the ride **100**. The subsequent cart **218** may also include the RFID tags **118**, which may be used to indicate the presence of the subsequent ride cart **218**. In some embodiments, the detection of the subsequent ride cart **218** may cause the cameras **114** to generate a 3D map of the ride cart **112**, and further initialize skeletal tracking. However, skeletal tracking would generate results indicating that no human skeletons are detected. Since guests are not detected, show scene features, such as the animated FIG. **102** and the lighting effects **104** may remain powered off, thereby conserving power.

FIG. **4** is a process flow diagram for a method **250** for generating face orientation determinations using the show scene controller **110** of the face orientation system **150** of FIGS. **2** and **3**. It should be noted that the method **250** may be performed as an automated procedure by a system, such as the face orientation system **150** including the show scene controller **110** and/or the show scene features **160**. Although shown in a particular sequence, it should be noted that the operations described with respect to the method **250** may be performed in different orders than shown and described and, indeed, such permutations of the method **250** are encompassed by the present disclosure. Further, certain steps or portions of the method **250** may be omitted and other steps may be added. The method **250** may be carried out in response to guests on a ride.

In some embodiments, the show scene controller may receive an indication (block **252**) that the ride cart **112** is present at a position of interest. The position of interest may be a particular range in front of, behind, or adjacent to the show scene features **160**, such as the animated FIG. **102**. Additionally or alternatively, the position may be based on the ride path **108** data. The memory **156** of FIG. **2** may store the ride path **108** data that includes information about the ride cart's **112** position along the ride path **108** as a function of time and/or other factors, which may be used to determine whether the ride cart **112** is present at the position of interest. In one embodiment, electronic readers **123** associated with the ride cart **112** may be scanned as the ride cart **112** traverses the ride path **108**. The RFID signals observed along the ride path **108** may provide an indication of the ride cart **112** location. Further, in some embodiments, an amount of elapsed time and/or other factors may be used to identify the location of the ride cart **112**, enabling the show scene controller **110** to determine when the ride cart **112** has reached the position of interest. In some embodiments, the sensor data input (e.g., via the cameras **114**, the weight sensor **120**, the IR markers **119**, and/or the RFID tags **118**), or the like may be used to identify the ride cart **112** position, and thus whether the ride cart **112** is at the position of interest.

Furthermore, the show scene controller **110** may use sensor data input to determine (block **254**) the ride cart **112** position within the ride **100** (e.g., the ride path **108** or the ride track **116**) by generating a 3D map of the ride cart **112** position using techniques previously described. As previously described, the 3D map generation may be based the known ride track **116** position and orientation, and known features within the ride **100**. (e.g., the ride track **116** turn towards a show scene feature at a midpoint on the ride). For example, the 3D map may generate the ride cart's **112** orientation, such as degree of turn or tilt, based on the ride track **116** positioning. Moreover, guest position data within the 3D map may be based on the ride cart **112** orientation and known ride cart **112** (e.g., seats are forward facing as the ride cart **112** moves along the ride path **108**). Thus, the ride cart **112** position may also be indicative of a guest position within the ride **100**.

After receiving indication that the ride cart **112** is positioned in the area of interest and determining the ride cart's **112** positioning, the show scene controller **110** may initialize (block **256**) sensors to detect one or more guests in the ride cart **112**. For example, the show scene controller **110** may output one or more signal(s) to activate the cameras **114** used for the skeletal tracking, facial recognition, and/or body recognition to begin detecting the guest's face position in the ride cart **112**. For example, guest presence may be detected by a discernable pattern (e.g., continuous solid color or design) on the back of the ride cart **112** seat in an image captured by the cameras **114**. In response to a guest in the seat, the pattern may not be visible (e.g., a break in the continuous solid color or design due to the guest covering up part of the pattern), indicating guest presence. On the other hand, when the seat is visible and the pattern is detectable, then the show scene controller **110** may determine that a guest is not present in the ride cart **112**. This indicates no one is present in the seat. Moreover, skeletal tracking may be used to determine guest presence, such that when an intersection of essential joints, bones, and limbs of a human skeleton is determined, a guest may be present in the ride cart **112**. On the other hand, if the skeletal tracking does not determine an intersection of skeleton joints, then a guest may not be present.

The show scene controller **110** may determine whether (decision block **258**) input received from the cameras **114** is indicative of a guest present in the ride cart **112** within the viewing range. In addition to guest presence determined using the cameras **114** for pattern recognition on a seat or skeletal recognition, the RFID tags **118** in guest wearables may be scanned when a guest is seated in the ride cart **112** to indicate guest presence.

If the show scene controller **110** receives an indication of guest vacancy (e.g., the cameras **114** captures image of empty cart when skeletal recognition is executed), no further face orientation detection is needed, at least for a particular seat within the ride cart. Accordingly, the show scene controller **110** may cause (block **260**) the guest detection sensors to stop detecting and/or processing guests in portions of the ride cart **112** where vacancy is indicated.

However, if the signal indicates that guests are present in the ride cart **112** seats, then the show scene controller **110** may continue to perform skeletal tracking recognition or tracking to detect (block **262**) the guest's body and/or head. For example, the skeletal tracking may consider relative positioning of essential joints, bones, and limbs of a human skeleton to generate a skeletal model. As previously discussed, joints located closer together on the skeletal model may indicate that the body and/or head is turned towards the particular direction. Moreover, the ride cart **112** data that may take into account particular points on the ride track **116** and show scene features along the ride path **108**, may be used in conjunction with the skeletal tracking to determine face orientation and make future face rotation predictions.

Additionally or alternatively to the skeletal tracking used to generate a skeletal image of a guest, facial and/or body recognition may be optionally executed (as indicated by a dashed line) to detect (block **264**) the guest's facial features, such as for rides using a more granular analysis of face orientation. As previously described, facial recognition may include considering points of facial interest and their intersection (e.g., two eyes aligned along a horizontal line in close proximity to a nose along a vertical line, detected at or near a point between each eye). Similarly, body detection may consider body features and their intersection, such as face, arms, and legs or upper body. Both facial and body recognition may allow for more accurate facial feature and/or body determinations, which may be used for face orientation and future rotation determinations. By way of example, a slow paced stand-up ride with guests standing in the ride cart **112** may utilize both body and face recognition techniques.

For example, in some embodiments, the skeletal image algorithms may indicate a guest's body orientation within the ride cart **112** by observing the relative closeness of skeletal joints. This information may provide an indication of likely body and, thus, face orientation. By way of example, knee joints close together and turned towards a particular side (e.g., the left side) of the ride cart **112** may indicate the guest's body and head is turned in this orientation (e.g., to the left).

Similarly, facial recognition algorithms may indicate orientation of the face based on the closeness of detected facial features. For example, when facial features (e.g., eyes) are detected towards one side of the face, this may indicate that the face is turned in a direction corresponding that side of the face (e.g., eyes detected towards the left side of the face may indicate that the guest if facing left).

By using both the skeletal tracking and facial and/or body recognition in conjunction with the previously determined ride cart **112** presence and positioning within the ride **100**, the show scene controller **110** may determine (block **266**) the face orientation of the guest. Specifically, ride cart orientation is used as a baseline orientation for the body of a guest, which can then be combined with the skeletal and/or facial and body data to find the precise orientation of the face.

Furthermore, in some embodiments, machine learning may be used to determine (block **267**) which way the face may be turning based on reoccurring face orientation determinations made for guests at the particular position within the ride **100**. By way of example, if a face orientation of a guest is determined to be positioned to the left (e.g., towards a show scene feature) at a particular point on the ride path **108**, then the show scene controller **110** may learn via machine learning to predict a face orientation as the same orientation for that position on the ride path **108**. Moreover, the face orientation algorithms of the show scene controller **110** may be updated using machine learning for previously determined skeletal tracking and face and/or body recognition data and confirmed indications of actual facial orientations of the guests associated with the previously determined skeletal tracking and face and/or body recognition data. The face orientation algorithms may be updated in order to predict or determine more accurate face orientations and where the face orientation may be turning considering the positioning of the guest within the ride **100**.

Next, the face orientation determination may be used to control the show scene features **160** along the ride path **108**. The show scene controller **110** may determine whether (decision block **268**) the guest's face orientation is within a particular distance from the show scene features **160**. In other words, the show scene controller **110** may determine that the guest's face is oriented within the particular distance of the show scene feature when both the guest's face is within the particular distance of the show scene feature and the guest's face is determined to be oriented in a viewing range of the show scene feature.

If the face orientation is within the particular distance (e.g., within 3 meters, circumference from the animated FIG. **102**) and the user's face is oriented in the viewing range of the show scene feature, then the show scene feature may be activated (block **270**) or updated to reflect a change, as previously described. By way of example, a guest's face orientation may be facing the animated FIG. **102** that is within a particular range of the guest, and the show scene controller **110** may send an animation control signal to the animated FIG. **102**. The animation control signal may be processed by a processer of the animated FIG. **102** and cause the animated FIG. **102** to change, such as by smiling or waving using actuators, as described above.

However, if the guest's face orientation is not within the particular distance of the show scene features **160** or is not oriented in a viewing range of the show scene features **160**, then the show scene feature is not activated. This provides a more personalized experience that may reduce power usage and/or wear on the show scene features.

In some situations, the guest may orient towards the show scene feature after an initial detection that the guest's orientation is not within the predetermined distance of the show scene feature. Accordingly, additional orientation determinations may be performed. In such a case, the show scene controller **110** may determine whether (decision block **272**) the ride cart **112** is still present at a position of interest as it moves along the ride path **108**. Continuing with the animated FIG. **102** example, if the animated FIG. **102** is no longer within the particular distance **202** from the guest facing the animated FIG. **102**, then the show scene controller **110** may cause (block **260**) the sensors (e.g., the cameras **114**) to stop detecting guests on the ride cart **112**.

However, if the ride cart **112** continues to be positioned at a point of interest, then the show scene controller **110** may receive (block **252**) indication that the ride cart **112** is present at the point of interest and take subsequent steps of determining ride cart **112** positioning, initialize sensors to detect guests on the ride cart **112**, etc.

As may be appreciated, the current techniques, which relate to facial orientation detection based upon contextual data related to a ride and/or guest's body may provide significant benefits. For one, less granular analysis of facial orientation may provide increased efficiencies in orientation processing, which may be especially useful in fast paced amusement rides. Further, triggering show scene features based upon the detected facial orientation may provide increased power utilization efficiencies, may reduce wear on the show scene features, and/or may provide a more personalized ride experience.

While only certain features of the disclosure have been illustrated and described herein, many modifications and changes will occur to those skilled in the art. It is, therefore, to be understood that the appended claims are intended to cover all such modifications and changes as fall within the true spirit of the disclosure. It should be appreciated that any of the features illustrated or described with respect to the figures discussed above may be combined in any suitable manner.

The techniques presented and claimed herein are referenced and applied to material objects and concrete examples of a practical nature that demonstrably improve the present technical field and, as such, are not abstract, intangible or purely theoretical. Further, if any claims appended to the end of this specification contain one or more elements designated as "means for [perform]ing [a function] . . . " or "step for [perform]ing [a function] . . . ", it is intended that such elements are to be interpreted under 35 U.S.C. 112(f). However, for any claims containing elements designated in any other manner, it is intended that such elements are not to be interpreted under 35 U.S.C. 112(f).

The invention claimed is:

1. A ride system, comprising:

one or more sensors; and

one or more controllers configured to:

receive position data of a guest from the one or more sensors, the position data indicative of a position of a body, a face, or a combination thereof, of the guest, on a ride;

determine face direction, face rotation, or a combination thereof, of the guest based at least in part upon the position data, wherein the position data is indicative of a first position of a first facial feature of the guest within a threshold distance from a second facial feature of the guest; and

control one or more features of the ride based upon the determined face direction, face rotation, or the combination thereof.

2. The ride system of claim **1**, wherein the position data comprises a skeletal image determined by skeletal tracking.

3. The ride system of claim **2**, wherein the face direction, the face rotation, or the combination thereof, is based at least in part on a first additional position of a first body joint of the guest within an additional threshold distance from a second additional position of a second body joint of the guest, on the skeletal image.

4. The ride system of claim **1**, wherein the one or more controllers are configured to:

determine the face direction, face rotation, or the combination thereof, of the guest using a machine learning model that identifies patterns of previous guests on the ride.

5. The ride system of claim **1**, wherein a direction of a first side of the face of the guest, a second side of the face opposite the first side, or a center of the face is indicated at least partially by the threshold distance.

6. The ride system of claim **1**, wherein the ride comprises a ride cart and the one or more controllers are configured to:

determine the face direction, face rotation, or the combination thereof, of the guest based upon the position of the body, the face, or the combination thereof within the ride cart.

7. The ride system of claim **1**, wherein the ride comprises a ride cart and the one or more controllers are configured to:

receive an indication of a position of the ride cart along a path of the ride from the one or more sensors; and

determine the face direction, the face rotation, or the combination thereof, based at least in part on the position of the ride cart.

8. The ride system of claim **7**, wherein the position of the ride cart is based at least in part on a structure of the ride cart, a known ride path of the ride, or a combination thereof.

9. The ride system of claim **1**, wherein controlling the one or more features comprises:

causing actuation of the one or more features when the determined face direction, face rotation, or the combination thereof is oriented toward the one or more features; and

refraining from causing actuation of the one or more features when the determined face direction, face rotation, or the combination thereof is oriented away from the one or more features.

10. The ride system of claim **9** wherein the actuation of the one or more features comprises:

animating an animated figure, displaying an image on a display, generating lighting of a light effect, or a combination thereof.

11. A method, comprising:

receiving position data of a guest from one or more sensors, the position data indicative of a position of a body, a face, or a combination thereof, of the guest, on a ride;

determining face direction, face rotation, or a combination thereof, of the guest based at least in part upon the position data, wherein the position data is indicative of a first position of a first facial feature of the guest within a threshold distance from a second facial feature of the guest; and

controlling one or more features of the ride based upon the determined face direction, face rotation, or the combination thereof.

12. The method of claim **11**, wherein the position data comprises a skeletal tracking image, a facial recognition image, a body recognition image, or a combination thereof.

13. The method of claim **11**, wherein the one or more sensors comprise radio frequency identification (RFID) tags, proximity sensors, infrared (IR) markers, weight sensors, cameras, or any combination thereof; and

wherein the RFID tags, the proximity sensors, the IR markers, the weight sensors, the cameras, or any combination thereof, are placed on a ride path of the ride at one or more points of interest to track or predict the position of the guest on the ride within the ride path.

14. The method of claim **13**, comprising:

determining the face direction, face rotation, or the combination thereof, of the guest using a machine learning model that identifies patterns of previous guests on the ride at the predicted position of the guest on the ride within the ride path.

15. A tangible, non-transitory, machine readable medium comprising machine-readable instructions that, when executed by one or more processors of a machine, cause the machine to:

receive position data of a guest from one or more sensors, the position data indicative of a position of a body, a face, or a combination thereof, of the guest, on a ride;

determine face rotation, face direction, or a combination thereof, of the guest based at least in part upon a first position of a first facial feature of the guest within a threshold distance from a second facial feature of the guest; and

control one or more features of the ride based upon the determined face direction, face rotation, or the combination thereof.

16. The machine readable medium of claim **15**, wherein the position data comprises an orientation of a ride cart of the guest, the machine readable medium comprising machine-readable instructions that, when executed by the one or more processors of the machine, cause the machine to:

determine the position of the body based at least in part upon the orientation of the ride cart.

17. The machine readable medium of claim **15**, comprising machine-readable instructions that, when executed by the one or more processors of the machine, cause the machine to:

determine the face rotation, face orientation, or the combination thereof as a prediction of a future face rotation, face orientation, or combination thereof, prior to the face rotation, face orientation, or the combination thereof occurring.

18. The machine readable medium of claim **15**, wherein a three-dimensional (3D) map of the guest on the ride is generated based on the position data and a position of a ride cart on the ride, wherein the 3D map indicates the determined face rotation of the guest relative to the one or more features of the ride.

19. The machine readable medium of claim **18**, wherein the determined face rotation uses machine learning to accurately predict face position based on reoccurring face direction determinations made for specific portions of the ride within the 3D map.

20. The method of claim **11**, wherein controlling the one or more features comprises:

causing actuation of the one or more features when the determined face direction, face rotation, or the combination thereof is oriented toward the one or more features; and

refraining from causing actuation of the one or more features when the determined face direction, face rotation, or the combination thereof is oriented away from the one or more features.

21. The ride system of claim **1**, wherein the threshold distance is relative to one or more reference points.

22. The ride system of claim **21**, wherein the ride comprises a ride cart and the one or more reference points correspond to one or more features of the ride cart.

23. The ride system of claim **21**, wherein the one or more reference points correspond to a first side of the face of the guest, a second side of the face opposite the first side, or a center of the face.

24. The method of claim **11**, wherein the threshold distance is relative to one or more reference points.

25. The method of claim **24**, wherein the one or more reference points correspond to one or more features of a ride cart of the ride.

26. The method of claim **24**, wherein the one or more reference points correspond to a first side of the face of the guest, a second side of the face opposite the first side, or a center of the face.

27. The machine readable medium of claim **15**, wherein the threshold distance is relative to one or more reference points.

28. The machine readable medium of claim **27**, wherein the one or more reference points correspond to one or more features of a ride cart of the ride.

29. The machine readable medium of claim **27**, wherein the one or more reference points correspond to a first side of the face of the guest, a second side of the face opposite the first side, or a center of the face.

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